

IN THE CLAIMS:

Please cancel claims 33-36.

1. (Original) A method for selecting and modifying the shape of eyeglasses utilizing a system, said method comprising the steps of:

receiving at least one image of a person's face and storing the received image in an image database;

displaying the stored image to a user;

displaying to the user a plurality of styles of glass-frames available through the system;

receiving the position of the center of the pupils in the image;

determining the axis of symmetry of the person's face and an approximate contour of the face as an elliptical two-dimensional template;

determining a proper size of the selected frame; and

generating a virtual image of the person wearing the selected frame by superimposing the image of the glass-frame to the image of the face.

2. (Original) A method in accordance with Claim 1 wherein said step of determining a proper size of the selected frame comprises the step of utilizing a two-dimensional template to determine a position of eyes on the displayed image.

3. (Original) A method in accordance with Claim 1 further comprising the step of refining the position of the center of the pupils to subpixel precision utilizing template matching.

4. (Original) A method in accordance with Claim 1 further comprising the step of determining the position of features on the person's face.

5. (Original) A method in accordance with Claim 1 further comprising the step of receiving a frontal image of the person's face and storing the frontal image in a database.

6. (Original) A method in accordance with Claim 1 wherein the system includes a server connected to at least one user device, said method further comprising the step of accessing the server via the user device.

7. (Original) A method in accordance with Claim 6 wherein the server is connected to the user device via a network.

8. (Original) A method in accordance with Claim 7 wherein the network is one of the Internet, an intranet, and a wide area network.

9. (Original) A method in accordance with Claim 1 wherein said step of receiving at least one image comprises the step of receiving two or more images of the person's face simultaneously obtained from two or more cameras oriented in a particular configuration.

10. (Original) A method in accordance with Claim 9 further comprising the steps of: estimating the epipolar geometry of the configuration of the cameras; and generating a three-dimensional model of the person's face.

11. (Original) A method in accordance with Claim 10 further comprising the steps of: determining pixel correspondence along scan-lines using normalized correlation with sub-pixel interpolation;

determining the depth corresponding to each pixel utilizing triangulation; and generating a three-dimensional mesh of the position of the pixels.

12. (Original) A method in accordance with Claim 11 further comprising the steps of: fitting a three-dimensional template of a face to the generated three-dimensional mesh;

generating an image of the three-dimensional model of the face; and
superimposing the glass-frame model to the person's face model to generate a virtual image of the person's face wearing the glass-frames.

13. (Original) A method in accordance with Claim 1 further comprising:
representing the shape of the lens using a parameterized curve or a piecewise linear curve wherein the shape depends upon the position of a number of control points;
representing the shape of the lens and the front rim using a constrained parameterized curve, where in the lens shape depends upon the position of the control points; and
constraining the position of the control points to maintain the perimeter of the rim approximately constant and to maintain the tangent at the hinge and bridge, and the maximum curvature below a prescribed bound determined by the properties of the frame.

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14. (Original) A method in accordance with Claim 13 further comprising the step of
modifying the selected glass-frame style by changing the position of the control points while maintaining the perimeter approximately constant.

15. (Original) A method in accordance with Claim 13 further comprising the steps of:
maintaining the tangents of the selected glass-frames at the hinges and bridge constant;
and

modifying the selected style to have a prescribed perimeter, while minimizing the distortion from the style selected by the user. 112, 2nd

16. (Original) A method in accordance with Claim 1 further comprising the steps of:
associating a position of a set of control points to a set of perceptual qualities stored in a database; and

modifying the shape of the lens based upon perceptual qualities.

17. (Original) A method in accordance with Claim 16 wherein said step of modifying the shape of the lens comprises the step of modifying the shape of the lens based upon perceptual qualities chosen by the user.

18. (Original) A method in accordance with Claim 17 further comprising the steps of

storing selected designs;

comparing the stored designs;

performing collaborative filtering; and

recommending to the user shapes and styles according to selections of other customers that best match the choices of the current customer.

19. (Original) A method in accordance with Claim 1 further comprising the step of controlling a lens grinding machine in accordance with data received by the system.

20. (Original) A method in accordance with Claim 1 wherein the system includes a database of maps between the geometry of the glass-frame, represented by the position of a number of control points, and the perceptual quality of the shape, said method further comprising the steps of:

modifying the selected shape by specifying the amount of each descriptive quality;

adapting the database to particular clientele; and

performing collaborative filtering to suggest shapes and a style that matches the choices of other customers with potentially similar preferences.

21. (Original) A method in accordance with Claim 20 wherein the database is one of a learning database utilizing psychophysical experiments and empirically established database.

22. (Original) A method in accordance with Claim 1 further comprising the step of modifying the selected style and shape of the frame with satisfying constraints due to manufacturing process and inventory.

23. (Original) A method in accordance with Claim 22 further comprising the steps of: evaluating the constraints within which any given frame can be modified; and enforcing the constraints during frame modification.

24. (Original) A method in accordance with Claim 1 further comprising the step of receiving prescription data for the lenses.

25. (Original) A method in accordance with Claim 1 further comprising the step of transmitting shape and style data to a manufacturer who ships the selected eyeglasses directly to the customer.

26. (Original) A method in accordance with Claim 1 further comprising the steps of: selecting landmark points of the person's face; tracking the selected points through time as the person moves their head; and estimating the three-dimensional motion of the landmark points on-line.

27. (Original) A method in accordance with Claim 1 further comprising the step of generating a two and a half dimensional model.

28. (Original) A method in accordance with Claim 27 further comprising the step of selecting a feature template for relevant facial features.

29. (Original) A method in accordance with Claim 28 further comprising the steps of:

tracking the position of the feature templates from frame to frame; and
selecting a reference frame.

30. (Original) A method in accordance with Claim 29 wherein said step of selecting a reference frame comprises the steps of:

selecting a reference frame from one of a 2-D Euclidean, 2-D Affine, 2-D Projective, and 3-D Euclidean; and

estimating a transformation.

31. (Original) A method in accordance with Claim 30 further comprising the step of using the estimated transformation to modify the appearance of a glass-frame template.

32. (Original) A method in accordance with Claim 1 further comprising the step of creating a virtual image of the person's face moving and wearing the frames.

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